No of Pages : 2 Course Code : 12M025

Roll No:
(To be filled in by the candidate)

PSG COLLEGE OF TECHNOLOGY, COIMBATORE - 641 004

SEMESTER EXAMINATIONS, APRIL / MAY - 2015

BE – MECHANICAL / PRODUCTION ENGINEERING Semester : 6

12M025 AUTOMOBILE ENGINEERING

Time : 3 Hours **Maximum Marks : 100**

INSTRUCTIONS:
1. Answer **ALL** questions from GROUP – I.
2. Answer any **FIVE** questions from GROUP – II.
3. Answer any **ONE** question from GROUP – III.
4. Ignore the box titled as **"Answers for Group III"** in the Main Answer Book.

GROUP - I Marks : 10 x 3 = 30

1. Why is the automotive chassis frame narrowed at the front?
2. Classify chassis based on number of driving wheels.
3. What is the need for T-slots in IC engine piston?
4. "Supercharging is essential for an air craft engine". Justify the statement.
5. What is the difference between centrifugal and semi-centrifugal clutches?
6. How is the length of a propeller shaft varied automatically during the motion of a vehicle?
7. What are the beads? Why are they provided in a tyre?
8. State the reasons for excessive wear on inner and outer edges of a tyre?
9. "Independent suspension is normally applied to the front wheels and not to the rear wheels". Justify
10. How does the king-pin or steering axis inclination influence the directional stability of a vehicle?

GROUP - II Marks : 5 x 10 = 50

11. (a) List the different loads acting on the chassis frame and explain them briefly with suitable illustrations. (6)

    (b) Determine the power required to drive a vehicle weighing 1.5 tonnes up a gradient of 8^0 at a steady speed of 72 km/hr. The air resistance is 0.08 V^2 and rolling resistance is 250 N/tonne of the vehicle weight. (4)

12. Discuss in detail the role of nitrous oxide, supercharger and turbocharger in increasing the engine horse power.

13. Enumerate the different types of automotive gear boxes. Explain the power flow in a four forward and one reverse type synchromesh gear box for all the forward speeds and reverse speed with neat sketches.
14. Why is differential necessary in the transmission system of a car? With help of neat sketch describe the construction and working of a differential.
15. Describe in detail constructional features of tubed and tubeless tyres for automotive use. List also their relative merits and demerits
16. Differentiate the functions of a spring and a shock absorber. Explain the construction and working of a telescopic type shock absorber with the help of a neat diagram

GROUP - III **Marks : 1 x 20 = 20**

17. Derive suitable expression to find out the reaction forces at front and rear wheels of a vehicle when the brakes are applied on the (i) front wheel (ii) rear wheel and (iii) all the four wheels considering the vehicle is moving downhill. Using these expressions solve the following problem.

    A car weighs 13 kN and has a wheel base of 2.5 m. The centre of gravity of the car is 1.2 m in front of the rear axle and 0.8 m above the ground level. The coefficient of adhesion between the road and the wheel is 0.5. If the car is moving up an incline of angle whose sine is equal to 0.1, calculate:

    (i) Load distribution between front and rear axles when brake is applied on all the four wheels.

    (ii) Distance at which it can be stopped while going at a speed of 50 km/hr when only rear wheel brakes are applied.
18. Derive the expression for basic condition for a perfect steering mechanism and discuss in detail the Ackermann and Davis steering mechanism.

/END/

FD/RL